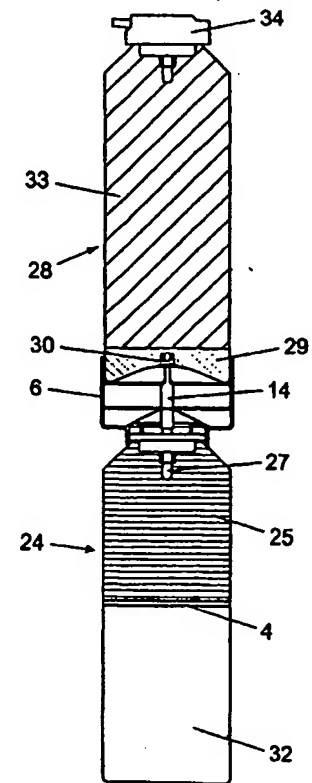




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<p>(21) International Application Number: PCT/GB99/03516 (22) International Filing Date: 22 October 1999 (22.10.99) (30) Priority Data: 9823029.5 22 October 1998 (22.10.98) GB (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 08/836,246 (CIP) Filed on 7 May 1997 (07.05.97) (71) Applicant (for all designated States except US): GILTECH LIMITED [GB/GB]; 12 North Harbour Estate, Ayr KA8 8AA (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): COOPER, Matthew, Martin, Derome [GB/GB]; 8 Gilchrist Place, Mossblown KA6 5DW (GB). HEALY, David, Michael [IE/GB]; Midton House, By Alloway, Ayr KA7 4EG (GB). (74) Agent: MURGITROYD & COMPANY; 373 Scotland Street, Glasgow G5 8QA (GB).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: PACKAGING SYSTEM FOR MIXING AND DISPENSING MULTICOMPONENT PRODUCTS (57) Abstract A packaging system which comprises a first container (24) having a valve (27) controlling the opening of an outlet and which contains a first ingredient (25), and a second container (28) having an openable entry portion (14) and containing a second ingredient (29). The packaging system further comprises means for connecting the first and second containers together in order to allow said first ingredient to be displaced from the first container into the second container via the entry portion thereof, so that said first and second ingredients are admixed in said second container to form a final product.  </p>		

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1 PACKAGING SYSTEM FOR MIXING AND DISPENSING MULTICOMPONENT PRODUCTS

2
3 The present invention relates to a packaging system for
4 combining and dispensing a product at its point of use.
5 The packaging system herein described is particularly
6 useful for combining and dispensing a mixture of
7 products.

8
9 The packaging of products is a significant
10 consideration for manufacturers and consumers. The
11 factors requiring consideration in selecting a
12 particular form of packaging include the suitability of
13 the packaging for containing the product throughout its
14 shelf life and the ease with which the product can be
15 dispensed.

16
17 Many household products are packaged in pressurised
18 aerosol containers. There are three main types of
19 aerosol containers: standard, piston and bag-in-can.
20 Standard aerosol containers are formed from aluminium
21 or tin plate and contain a mixture of product and
22 pressurised propellant. A piston can is an aluminium
23 can having the product separated from the pressurised
24 propellant by a piston which is normally polypropylene.
25 A bag-in-can container is formed from aluminium or tin

1 plate with the product held within a bag attached to
2 the can or valve, the propellant being held in the
3 space between the container and bag. Bi-cans, which
4 are a kind of bag-in-can type container also enable an
5 active ingredient to be kept separate from a propellant
6 gas. Bi-cans are usually formed from tin plate and
7 comprise two compartments separated by a piston within
8 the same can. The base of the can possesses a hole for
9 a Nicholson valve. This valve allows the bottom
10 compartment to be filled with a propellant gas. The
11 choice of aerosol container type for any particular
12 product is dependant upon the nature of the product and
13 also the propellant used. Other factors that affect
14 the choice of container include sterilisation (if
15 necessary), cost, and the acceptable amount of product
16 wastage (ie the amount of product which remains in the
17 container after full deployment).

18
19 Other parts of the complete aerosol device, such as the
20 valve used and the actuator, are also selected upon
21 their suitability having regard to the nature of the
22 product and the type of aerosol container. The method
23 of filling the container will also be affected
24 similarly.

25
26 Up to now aerosol devices could only be used with
27 products that are stable within the container and
28 therefore have a suitable shelf-life. However, there
29 are many materials which must be produced from two or
30 more ingredients mixed just prior to use. Examples of
31 such products include: glue and hardener, glass fibre
32 resin and catalyst, epoxy paints, hair colorants and
33 cement/concrete.

34
35 The present invention provides a packaging system

1 having a first container containing a first ingredient
2 and a second container containing a second ingredient,
3 the first and second containers being adapted for
4 connection together such that upon deployment of the
5 packaging system the first ingredient is displaced from
6 said first container into said second container and an
7 admixture of said first and second ingredients is
8 subsequently dispensed from the packaging system.

9
10 More particularly, the packaging system according to
11 the invention comprises:

- 12 a) a first container having a valve controlling the
13 opening of an outlet and containing a first
14 ingredient;
- 15 b) a second container having a openable entry
16 portion, containing a second ingredient; and
- 17 c) means for connecting the first and second
18 containers together in order to allow the first
19 ingredient to be displaced from the first
20 container into the second container via the entry
21 portion thereof, so that the first and second
22 ingredients are admixed in the second container to
23 form a final product.

24
25 Conveniently the passage of the first ingredient from
26 the first container through to the second container
27 causes the first ingredient to be intimately blended
28 with the second ingredient.

29
30 It is preferred that the connecting means comprises a
31 conduit to transfer said first ingredient into said
32 second ingredient.

33
34 Preferably the containers are each pressurised aerosol
35 containers and the initial pressure in the second

1 container may be less than that in the first conduit.

2

3 In one embodiment the first container is a piston-style
4 aerosol container. The first ingredient is placed into
5 the first container which is then fitted with a top
6 valve. The first container may then be sterilised, for
7 example by autoclave. The container is then
8 pressurised by inserting a propellant below the piston
9 via an aperture in the bottom of the can. A preferred
10 propellant is nitrogen gas, but a wide variety of
11 propellants can be used since there is no contact
12 between the propellant and the first ingredient (these
13 being separated by the piston). The pressurized
14 container is then sealed with a rubber bung or other
15 suitable means. Alternatively the first container may
16 be a bag-in-can style aerosol container, the first
17 ingredient being separated from the propellant by the
18 bag.

19

20 In one embodiment the second container may be an
21 aerosol container of known type, advantageously adapted
22 by having as an openable entry portion a Nicholson
23 valve or bung or other seal preferably located in the
24 bottom thereof. An example of another seal or entry
25 portion would be a thin portion or membrane which could
26 be pierced open. Thus, the second container is filled
27 with an appropriate quantity of second ingredient via
28 the top of the can which is then closed using a
29 standard valve. The container may be pressurized by
30 inserting a suitable propellant (desirably an inert
31 propellant that does not react with the first and
32 second ingredients). Alternatively, the second
33 container may become sufficiently pressurised by the
34 transfer of the first ingredient.

35

1 Optionally the connecting means are also provided with
2 means to hold the first and second containers in
3 suitable juxtaposition.

4
5 The conduit may be a tube, preferably composed of
6 plastics material.

7
8 In a preferred embodiment the first container is
9 positioned beneath the second container and connected
10 thereto via the connecting means. It is also preferred
11 that the first container be a standard directionally
12 biased pressure activated valve as commonly provided on
13 an aerosol can.

14
15 Optionally the conduit cooperates with the openable
16 entry portion of the second container so that when the
17 entry is opened, the conduit permits entry of the first
18 ingredient into the second container to take place.

19
20 Optionally the conduit is shaped to co-operate with the
21 valve of the first container and preferably to open it.
22 For example the conduit may comprise a bayonet-shaped
23 end.

24
25 Preferably the second container has a bottom-mounted
26 Nicholson valve or a bung which is removed or displaced
27 into the second container by the connecting means to
28 allow the entry of the first ingredient into the second
29 container. Thus, in one embodiment the conduit may
30 cooperate with the Nicholson valve located in the
31 bottom surface of the second container and will
32 displace the valve inwardly upon connection.

33
34 In one preferred embodiment the connecting means is
35 shaped and sized to facilitate the admixture of the

1 first and second ingredients within the second
2 container. To aid suitable dispensation of the first
3 ingredient, the conduit may terminate in a blind ending
4 and possess multiple openings (usually 2, 3 or 4) in
5 the side of the conduit, generally adjacent the blind
6 end thereof. In one example the conduit openings may
7 be shaped and dimensioned to dispense the first
8 ingredient in a spiral flow so as to promote good
9 admixture of the first and second ingredients.

10

11 In one embodiment the connecting means comprises a
12 first sleeve projecting downwardly which engages the
13 top of the first container and a second sleeve
14 projecting upwardly which engages the bottom of the
15 second container. Thus, the first container is
16 positioned correctly with respect to the second
17 container via the connecting means. This sleeve, may
18 be composed of plastics material. The conduit is
19 carried within the aperture of the sleeve. Desirably
20 the sleeve forms a close-fit with the first and second
21 containers. For example, the internal surface of the
22 sleeve may comprise a series of ridges extending
23 circumferentially. In use the first container may be
24 pushed past one or more of these ridges to be locked
25 into place and cause transfer of the first ingredient
26 to the second container via the conduit.

27

28 Advantageously, means to actuate the displacement of
29 the first ingredient to the second containers includes
30 means to hold the first and second containers in
31 suitable juxtaposition.

32

33 The sleeve may be used to retain the first container
34 beneath the second container during both storage and
35 distribution. The sleeve will also be responsible for

1 holding the containers together such that the contents
2 of the first container may be transferred into the
3 second container.

4
5 Optionally the sleeve may include or be attached to an
6 anti-tamper device.

7
8 The connecting means may be moulded from plastics
9 material as a one piece unit. Alternatively, and
10 desirably, the sleeve may be formed from a first and
11 second part which are rotatable relative to each other.
12 The first part comprises both the conduit and the first
13 and second sleeves. The second part comprises a third
14 sleeve which is secured to or part of the bottom of the
15 second container. The second and third sleeves have
16 corresponding screw threads, which allow these second
17 and third sleeves to be moved from a first position
18 where the conduit is not actuating the openable entry
19 portion to a second position where said conduit
20 actuates said openable entry when transfer of the first
21 ingredient is required.

22
23 Thus, the sleeve parts may simply be screwed together
24 to initiate transfer of the first ingredient.
25 Desirably there may be a ratchet mechanism to prevent
26 reversal of the rotation of the sleeve parts. In one
27 embodiment the relative rotation of the sleeve parts is
28 through approximately 120°.

29
30 Preferably each of the containers may be sterilised,
31 for example by autoclave techniques or by irradiation.

32
33 Conveniently the second container may be filled with
34 the second ingredient via an aperture in the bottom of
35 the container which is then sealed, for example with a

1 rubber bung or Nicholson valve. This seal or valve may
2 then be pushed into the container by the connecting
3 means upon activation.

4

5 Preferably also the second container has a top mounted
6 actuator which controls the dispensation of its contents.

7

8 Optionally each of the containers may also be adapted
9 to dispense the ingredients contained therein in a
10 conventional manner.

11

12 In a preferred embodiment the first ingredient is a
13 gel, preferably a foamable gel, and the second
14 ingredient is a powder.

15

16 In a preferred embodiment of the invention the
17 packaging system of the present invention is designed
18 to discharge the material described in WO-A-96/17595 of
19 Giltech Limited wherein the powder constituent of said
20 formulation is the second ingredient and is contained
21 within the second container and the gel constituent of
22 said formulation is the first ingredient and is
23 contained within the first container.

24

25 In a preferred embodiment of the invention the
26 connecting means is used to connect two aerosol
27 canisters, which together contain the ingredients
28 required to make a silver ion releasing water-soluble
29 glass held in an alginate foam as described in WO-A-
30 96/17595 of Giltech Limited.

31

32 In this embodiment the first container is a piston type
33 aerosol canister, which contains a foamable gel (eg
34 alginate) which is pressurised to approximately 130
35 psi, for example with nitrogen gas. The second

1 container contains the powder ingredients of said foam
2 (eg a water-soluble glass powder) and is pressurised to
3 approximately 50 psi, for example with a liquified
4 petroleum gas (eg CFC, HC, HFC propellants). However,
5 the first container may also be a bag-in-can aerosol
6 container where the first ingredient is separated from
7 the propellant by a bag.

8
9 The whole apparatus may be shaken after transfer of a
10 the first ingredient to ensure proper mixing of the
11 first and second ingredients before the foam can be
12 discharged. Once discharge is complete the apparatus
13 may be discarded.

14
15 The packaging system described herein is based upon
16 pressure differentials. When the containers are
17 connected, if the pressure in the second container is
18 less than that in the first container, upon connection
19 the contents of the first container will flow into the
20 second container as required. At equilibrium if the
21 pressure in the second container is equal to the
22 pressure in the first container no further transfer of
23 material will take place. If the pressure in the
24 second container is greater than the pressure in the
25 first container the contents of the second container
26 could flow back into the first container. This flow
27 can however be prevented by the use of a one way valve
28 at the top of the first container.

29
30 The propellant selected for the second container is
31 usually an excipient of the final product, which is
32 produced by mixing the contents of the first container
33 with the second container. The excipient is a
34 substance conveniently used as a medium or a vehicle
35 for administering the final product. It is

1 advantageously a gas which does not react with the
2 first and second ingredients. However, if a barrier
3 type canister is used as the first container, the
4 propellant used for the first container will not be
5 introduced into the second container. It will not
6 therefore affect the final product.

7
8 If a liquified gas is used as the propellant in the
9 second container, the vapour pressure of this gas can
10 be determined by mixing quantities of liquified gases
11 at various vapour pressures until the desired pressure
12 is reached. Vapour pressure is that pressure at which
13 the closed system is at equilibrium.

14
15 This can be explained in more detail as follows:
16 If a known volume of liquid gas is introduced into a
17 vacuum at a given temperature T the liquified gas will
18 boil and vaporize to occupy all of the available space
19 in the container. The pressure in the container will
20 rise as the gas expands. At equilibrium the remaining
21 liquified gas will not have enough energy to vaporize
22 and the pressure of the gaseous phase is not high
23 enough to cause condensation of the gas. This
24 equilibrium point can be measured as a stable pressure
25 reading at the valve or entry point. A reduction in
26 the volume of the container will lead to an increase in
27 the volume of liquified gas and vice versa, but the
28 pressure will remain constant at a given temperature.

29
30 The liquified gas propellants give a constant pressure
31 throughout the expulsion of products. They can also
32 readily dispense thicker product more easily than
33 compressed gas as their pressure will not decrease
34 until all the liquid phase propellant has been
35 expelled.

1 If a pressurised gas (air, nitrogen, etc) was used in
2 the second container then the pressure fill would have
3 to be lower than the first container to allow for a
4 pressure increase when product is introduced from the
5 first container. If the pressure equalises during the
6 transfer flow of product will cease. As the product is
7 dispensed the pressure in the second container will
8 decrease and dispersion will be slowed.

9
10 If the first container and the second container are
11 standard aerosol canisters with no barrier type system,
12 product and propellant from the first container will
13 flow into the second container until equilibrium is
14 reached in the two containers.

15
16 The principles of the present invention could be used
17 to mix contents from virtually any number of containers
18 (so long as there is an appropriate pressure difference
19 between one container and the next).

20
21 The connection means of the present invention thus
22 provides a means for mixing the contents of two or more
23 separate aerosol containers together in one of the
24 aforementioned aerosol containers. This is
25 particularly useful when an aerosol dispenser is
26 required to dispense a mixture of ingredients that
27 would otherwise be too unstable to be stored in just
28 one single aerosol container.

29
30 The packaging system of the invention may comprise more
31 than two containers which are successively connected
32 together with connection means. Advantageously each
33 container would be appropriately pressurised to drive
34 its contents into the next container following
35 activation of the connecting means linking the two

1 containers together, to form an admixture. Thus, the
2 contents of the initial container will be transferred
3 to its immediate neighbour and the admixture so formed
4 will be subsequently transferred to the next container
5 of the series. This process will be repeated until the
6 final container contains the full admixture which can
7 then be dispensed.

8
9 Embodiments of present invention will now be described
10 by way of example and with reference to the
11 accompanying drawings, in which:

12
13 Fig. 1 is a perspective view of a first embodiment of
14 the connecting means of this invention;

15
16 Fig. 2 is a plan view from above of the connecting
17 means of Fig. 1;

18
19 Fig. 3 is a cross-section of the connecting means of
20 Fig. 2 taken along line A-A;

21
22 Fig. 4 is a plan view from below of the connecting
23 means of Figs 1 to 3;

24
25 Fig. 5 is a cross-sectional view of the connecting
26 means of Figs. 1 to 4 attached to a first container and
27 ready to receive a second container;

28
29 Fig. 6 shows in cross-section the packaging system of
30 Fig. 5 attached to a second container in storage mode;

31
32 Fig. 7 shows in cross-section the packaging system of
33 Fig. 6 in dispensing mode;

34
35 Fig 8. is a perspective view of the packaging system

1 showing the connecting means of Figs. 1 to 7 attached
2 to a first container and ready to receive a second
3 container (equivalent to Fig. 5);
4

5 Fig. 9 is a perspective view of the dispensing system
6 attached to a first container and a second container,
7 as the complete apparatus would be stored or
8 transported;
9

10 Fig. 10 is a cross-sectional view of one embodiment of
11 the invention, when the connecting means is attached to
12 two aerosol canisters in storage mode and indicating
13 the contents of the two containers schematically;
14

15 Fig. 11 is a cross-sectional view of the embodiment of
16 Fig. 10, with the canisters are in dispensing mode and
17 indicating the contents of the two containers
18 schematically;
19

20 Fig. 12 is a partial and exploded perspective view of a
21 second embodiment of a connecting means of this
22 invention showing a two-part connector;
23

24 Fig. 13 is a perspective view of the first part of the
25 connector shown in Fig. 12;
26

27 Fig. 14 is the first part of the connector shown in
28 Fig. 13 viewed from above;
29

30 Fig. 15 is the first part of the connector shown in
31 Fig. 13 viewed from below;
32

33 Fig. 16 is a cross-sectional view of the first part of
34 the connector shown in Fig. 14 along the line X-X;
35

- 1 Fig. 17a is a side view of the first part of the
2 connector shown partial cross-section (along line A-A
3 of Fig. 14);
4
5 Fig. 17b is an enlarged detail (scale 1:5) of snap bead
6 120 of the connector shown in Fig. 17a;
7
8 Fig. 17c is an enlarged detail (scale 1:5) of
9 protuberance 112 of the connector shown in Fig. 17a;
10
11 Fig. 18 is an enlarged partial cross-sectional view
12 (scale 2:1) of the first part of the connector shown in
13 Fig. 14 and taken along the line A-A;
14
15 Fig. 19 is a perspective view of the second part of the
16 connector shown in Fig. 12;
17
18 Fig. 20 is the second part of the connector shown in
19 Fig. 19 viewed from above;
20
21 Fig. 21a is the second part of the connector shown in
22 Fig. 19 viewed from below;
23
24 Fig. 21b shows an enlarged detail (scale 5:1) of the
25 track 210 of the connector shown in Fig. 19;
26
27 Fig. 22 is a side view of the second part of the
28 connector shown in Fig. 19;
29
30 Fig. 23a is a cross-sectional view of the second part
31 of the connector shown in Fig. 20 along line B-B;
32
33 Fig. 23b is an enlarged detail (scale 2:1) of the knurl
34 of the connector shown in Fig. 23a;
35

1 Fig. 23c is an enlarged detail (scale 5:1) of the
2 pathway 212 of the connector shown in Fig. 23a;

3
4 Fig. 24 is the second part of the connector of Fig. 19
5 shown attached to a second container and viewed from
6 above;

7
8 Fig. 25 is a longitudinal and cross-sectional view
9 along line X-X of Fig. 24 of the connecting means shown
10 in Fig. 12 in storage mode, and wherein a second
11 container is shown attached to the second part of the
12 connector, the two parts of the connector being
13 connected together in a storage mode and with a tamper
14 band provided;

15
16 Fig. 26 is a cross-sectional view similar to Fig. 25
17 except that the tamper band has been removed and that
18 the cross sectional view is taken along line X'-X' of
19 Fig. 24; and

20
21 Fig. 27 is a cross-sectional view similar to Fig. 25
22 except that the two parts of the connector have been
23 positioned in dispensing mode and that the view is
24 taken along lines A-A of Fig. 24.

25
26 In more detail, Figs 1-4 show the connecting means 2 of
27 the present invention, which is preferably formed from
28 a single piece of plastics material. The connecting
29 means 2 comprises a cylindrically shaped sleeve 6
30 having at its bottom edge an inwardly projecting and
31 essentially horizontal shelf 8. The inner edge of
32 shelf 8 projects downwardly to form a sleeve 22 having
33 a smaller internal diameter than major sleeve 6. The
34 internal diameter of sleeve 6 is chosen to form a close
35 fit with the second container of the invention. As

1 illustrated two circumferentially extending ridges 10,
2 12 are located on the internal surface of sleeve 6 to
3 promote a good grip between connecting means 2 and the
4 second container (not shown).

5
6 The internal diameter of smaller sleeve 22 is chosen to
7 form a close fit with the top of first container of the
8 present invention, which may conveniently be a
9 conventionally sized neck collar of a commercially
10 available aerosol canister.

11
12 Figs 1-4 show a conduit extending through sleeve 6 at
13 approximately the centre thereof. The conduit 14 is
14 supported at its lower end by projections 16, 18 and 20
15 which extend from the inner edge of shelf 8 to the
16 conduit. In the embodiment illustrated only three
17 projections are shown, but more projections may also be
18 present. Preferably the projections are spaced
19 equidistantly from each other. As is best seen in Fig
20 3, the aperture of conduit 14 narrows at shoulder 15,
21 the upper narrow portion of conduit 14 terminating in a
22 blind ending 13. Small apertures 15a, 15b, 15c are
23 present in conduit 14 and spaced equidistantly around
24 shoulder 15. These apertures 15a, 15b and 15c are best
25 seen in Figs 5-7.

26
27 Figs 5-7 and 8-9 demonstrate how connecting means 2 may
28 be used to connect the first and second containers. As
29 shown in Fig 5 the connecting means 2 can be pressed on
30 to the first container 24, the inner surface of sleeve
31 22 forming a close fit with the external diameter of
32 neck collar 26 on container 24. The internal diameter
33 of the lower portion of conduit 14 is chosen to form a
34 close fit with the standard valve 27 of container 24.
35 Fig 5 shows a second container 28, having been aligned

1 with connecting means 2, moving in the direction of the
2 arrows in order to connect therewith.

3
4 As shown in Fig 6, the second container 28 is then
5 located within the upper portion of sleeve 6 and the
6 packaging system may be stored and/or transported in
7 this position. In this position the bottom of
8 container 28 is pushed as far as ridge 10 and the blind
9 end 13 of conduit 14 is located directly beneath and
10 abuts the Nicholson valve 30 sealing the bottom of the
11 second container 28.

12
13 Downward pressure is applied until the bottom of the
14 second container 28 abuts ridge 10 of the sleeve 6 and
15 the top of conduit 14 abuts the seal or Nicholson valve
16 30. This is the storage/distribution mode of the
17 packaging system 1.

18
19 In order to activate the packaging system of the
20 present invention and to initiate transfer of the first
21 ingredient from the first container 24 into the second
22 container 28, the second container is moved relative to
23 the connecting means 2 into the position illustrated in
24 Fig 7. As shown in Fig 7, conduit 14 has partially
25 penetrated into the interior of container 28, the seal
26 or Nicholson valve 30 being pushed inwardly and, as
27 illustrated, retained upon the blind end 13 of conduit
28 14. The valve 27 of first container 24 is activated by
29 pushing that container, and thus valve 27, into conduit
30 14 as far as shoulder 15. The presence of shoulder 15
31 in conduit 14 causes the valve 27 to be activated and
32 the pressure within the first container 24 is released,
33 the propellant therein expanding and causing
34 displacement of the first ingredient along the conduit
35 14, through apertures 15a, 15b and 15c and into the

1 interior of the second container 28. Desirably, the
2 apertures 15a, 15b, 15c are shaped, dimensioned and
3 spaced to cause the first ingredient to be introduced
4 into the interior of second container 28 in a spiral
5 motion (eg having vortex characteristics) which causes
6 admixture of the first and second ingredients.

7
8 Fig 8 illustrates a connecting means 2 positioned onto
9 a first container 24 and ready to receive the second
10 container 28 which is moving in the direction of the
11 arrows.

12
13 Fig 9 illustrates the first and second containers 24,
14 25 held in vertical juxtaposition by connecting means
15 2. Moving the second container 28 in a downward motion
16 would cause activation of the upper valve 27, (shown in
17 Figs 10 and 11) on the first container 24 and
18 displacement of the first ingredient into the second
19 container 28. Activation of the valve 34 (not shown)
20 on top of the second container 28 would then allow
21 dispensation of the admixture of the first and second
22 ingredients. As the packaging system 1 of the present
23 invention is designed specifically to aid dispensation of
24 ingredients which are normally incompatible during
25 storage, complete deployment of the device would
26 normally occur shortly after transfer of the first
27 ingredient into the second container.

28
29 Figs 10 and 11 show in schematic cross-section, the
30 transfer of the first ingredient 25 from the first
31 container 24 into the second container 28, to form an
32 admixture 29 with the second ingredient. As shown, the
33 first container 24 initially contains the first
34 ingredient 25 (for example a foamable gel) separated
35 from a pressurized propellant 32 (such as nitrogen

1 gas/liquid system) by a piston 4. Upon activation of
2 valve 27 located at the top of container 24, as caused
3 by the relative movement of containers 24, 28 together,
4 the pressure of container 24 is released and propellant
5 32 expands driving a piston 4 upwardly and pushing
6 first ingredient 25 through valve 27, conduit 14 and
7 into the interior of the second container 28 via
8 apertures 15a, 15b and 15c.

9
10 In the embodiment illustrated in Figs 10 and 11, the
11 second container 28 initially holds the second
12 ingredient 29 (which may be for example a powdered
13 active ingredient) and a gas/liquid pressure system of
14 a propellant 33. Initially the propellant 33 comprises
15 a significant volume of propellant in gaseous form, but
16 upon the introduction of the first ingredient 25, at
17 least part of the gaseous propellant is converted into
18 liquid. In Fig 11 the first and second ingredients
19 have formed an intimate admixture 31. Admixture 31 is
20 dispelled from the packaging system 1 by activation of
21 valve 34 located on the upper end of container 28.

22
23 Referring now to Figs. 12 to 27 there is shown a second
24 preferred embodiment of the invention wherein the
25 connecting means is a two-part connector 101. As shown
26 in the exploded view of Fig. 12 the connector 101 has a
27 first part 100 which is designed to be immovably
28 attached to a first container provided with a standard
29 valve 300 and a second part 200 which is designed to be
30 immovably attached to a second container 202.

31
32 Figs. 13 to 18 show the details of the first part 100
33 of the connector 101. More particularly Figs. 13 to 18
34 illustrate that the first part 100 comprises a
35 cylindrically shaped sleeve 106 having at its bottom

1 edge an inwardly projecting and essentially horizontal
2 shelf 108. The internal diameter of sleeve 106 is
3 chosen to co-operate with the second part 200 of
4 connector 101 of the invention.

5
6 The shelf 108 is pierced by apertures 126, 128 which
7 are each provided below protuberances 110 and 112
8 located on the inner wall of the sleeve 106.
9 Advantageously abutments 124 are provided on the upper
10 surface of the shelf 108, projecting upwardly from the
11 latter and inwardly from the inner wall of the sleeve
12 106. These abutments 124 limit the extent of insertion
13 of the second part 200 of the connector 101 when the
14 second part 200 is introduced into the sleeve 106.

15
16 Of course, whilst the embodiment illustrated contains
17 six abutments 124 arranged equidistantly around shelf
18 108, fewer or greater numbers of abutments 124 may be
19 present if desired. Preferably the abutments 124 are
20 spaced equidistantly from each other.

21
22 As illustrated in Figs. 13-17, two protuberances 110,
23 112 are located on the internal surface of sleeve 106
24 and these form a part of a locking system between the
25 two parts 100 and 200 of the connector 101 which will
26 be further described below. Fig. 17C shows in detail a
27 preferred shape of protuberance 112. A corresponding
28 shape would be used for the other protuberance 110.

29
30 A fluted band 103, which can be made of equidistantly
31 spaced ribs, is provided around the outer surface of
32 the sleeve 106 and advantageously provides a good
33 gripping surface for the user.

34
35 As best shown in Fig. 16, the inner edge of shelf 108

1 projects downwardly to form a sleeve 122 having a
2 smaller internal diameter than sleeve 106. The
3 internal diameter of sleeve 122 is chosen to form a
4 close fit with the top of the first container 102 which
5 may conveniently be a conventionally sized neck collar
6 of a commercially available aerosol canister. A snap
7 bead 120, best shown in Fig. 17, is advantageously
8 provided at the bottom edge of the sleeve 122 to
9 provide improved fitting with the neck collar of the
10 first container 102.

11

12 At the upper portion of sleeve 122 a number of small
13 ribs 119, best shown in Figs. 15, 16 and 18, are
14 positioned projecting downwardly into the aperture of
15 sleeve 122 and which are preferably equidistantly
16 spaced from each other. These small ribs 119 act both
17 as reinforcing members and spacing abutments with
18 respect to the top of the first container 102.

19

20 Figs. 13 to 18 illustrate a conduit 114 extending
21 partially along the aperture sleeve 106 and located at
22 approximately the centre thereof. The conduit 114 is
23 supported at its lower end by six (preferably
24 identical) projections 116 which extend from the inner
25 edge of shelf 108 to the conduit 114. Of course,
26 greater or fewer numbers of projections 116 may be
27 present if desired. Preferably the projections 116 are
28 spaced equidistantly from each other.

29

30 The internal diameter of the conduit 114 is chosen to
31 form a close fit with the dispensing tube of the first
32 container 102 which is conveniently sized and shaped as
33 a commercially available aerosol canister dispensing
34 tube. Alternatively, the lower end of conduit 114 may
35 terminate in an adaptor which is able to form the

1 required close fit. Longitudinal reinforcing ribs 118
2 (shown in Fig. 18) are present on the inner wall of
3 conduit 114 and may extend substantially along the
4 length of the interior of conduit 114. Preferably
5 there are three equidistantly spaced ribs 118.

6
7 As it is best seen in Figs. 16 and 18, the thickness of
8 the wall of conduit 114 may narrow at shoulder 115
9 reducing the external diameter whilst maintaining the
10 aperture diameter. The upper portion of conduit 114
11 then terminates in a blind ending 113 which is of
12 smaller cross-sectional area than conduit 114. Small
13 apertures 117 are located in and spaced equidistantly
14 around conduit 114. The apertures are located between
15 shoulder 115 and blind end 113, and in this portion of
16 conduit 114 narrows further, sloping inwardly to the
17 blind end 113. As best shown in Fig. 15, the
18 embodiment illustrated has three apertures 117 but this
19 can of course be varied if required.

20
21 Figs. 19 to 24 show the details of the second part 200
22 of the connector 101.

23
24 The second part 200 of the connector 101 is sized and
25 shaped to be located onto the bottom of a second
26 container 202 in a tight fit arrangement. The second
27 container 202 is sealed on its bottom surface by a bung
28 290 (for example a rubber bung or Nicholson valve) (see
29 Figs. 25-27).

30
31 As illustrated in Fig. 19, the second part 200
32 comprises a cylindrically shaped sleeve 206 having at
33 its inner bottom edge several ribs 208 which project
34 inwardly into the aperture of sleeve 206 and are of
35 arcuate form. The internal diameter of sleeve 206 is

1 chosen to form a close fit with the bottom of the
2 second container 202. Advantageously the second part
3 of the connector 101 is sized and shaped to receive the
4 bottom of the second container in a close fit manner.
5 The ribs 208 act as an additional attachment means and
6 cooperate with the bottom end of the second container
7 202 in a snap bead manner.

8
9 The external diameter of sleeve 206 is chosen to be
10 generally smaller than the internal diameter of sleeve
11 106 of the first part 100 of the connector 101. However
12 the external diameter of the bottom part of the sleeve
13 206 is chosen so as to be generally larger than the
14 internal diameter (taking into account the width of the
15 protuberances 110, 112 of the locking system) of sleeve
16 106. For example, in this particular embodiment, the
17 bottom end of the external surface of the sleeve 206 is
18 provided with several successive curved and protruding
19 ribs 216 which increase the external diameter of the
20 sleeve 206.

21
22 Two other sets of ribs 209, 211 and 213, 215 which
23 define two pathways or tracks 210 (shown in Figs. 21-
24 22) and 212 along the external surface of the bottom
25 part of the sleeve 206 interrupt the ribs 216. Such
26 pathways 210, 212 are sized and positioned to engage
27 the two corresponding protuberances 110 and 112
28 provided inside the sleeve 106. Upon rotation of at
29 least one of the two parts 100 or 200 of the connector
30 101, the protuberances 110, 112 are located at the
31 entrance of their respective pathway 210, 212. Upon
32 further rotation associated with reasonable pressure
33 applied to the each or both parts 100, 200 of the
34 connector 101 the protuberances 110, 112 are moved
35 further along the pathways 210, 212 until the sleeve

1 206 becomes further positioned within the sleeve 106 to
2 a pre-set maximum distance and the two parts 100, 200
3 of the connector 101 become locked together at a given
4 position which is determined by the pathways 210 and
5 212. In this primed position, the blind end 113 has
6 been pushed against the bung or Nicholson 290 valve
7 sealing the bottom surface of the second container,
8 displacing the bung or Nicholson valve 290 inwardly
9 into the interior of that container 202. In this
10 position apertures 117 are located within the cavity of
11 container 202 such that material dispensed from
12 container 102 would be dispensed therethrough.

13
14 Desirably when the two parts 100, 200 of the connector
15 are in the primed position it is not possible to simply
16 rotate these parts in the opposite direction to unlock
17 them from each other, but rather the shape and size of
18 protuberances 110, 112 and pathways 210, 212 means that
19 the two connectors become firmly "locked" together.

20
21 Preferably the ribs 209, 211, 213, 215 and 216 which
22 are provided on the external surface of the bottom end
23 of the sleeve 206 are of a given width which allows
24 close fitting of the sleeves 106, 206 of the two parts
25 100, 200 of the connector 101.

26
27 As best shown in Fig. 22 fluted band 203 may be
28 provided externally on the upper portion of the sleeve
29 206 to provide a good grip for the user's hand.

30
31 Figs. 25 to 27 show the first part 100 and the second
32 part 200 attached to the second container 202 in
33 different connecting positions.

34
35 The first part 100 can be pressed on to the first

1 container 102, the inner surface of sleeve 122 forming
2 a close fit with the external diameter of the neck
3 collar provided on the first container 102 (not shown
4 in Figs. 25 to 27). The internal diameter of the lower
5 portion of conduit 114 is chosen to form a close fit
6 with the standard valve 300 of container 102 (shown in
7 Fig. 12 and which may be similar to the valve 27 of the
8 previous embodiment (see Fig. 5).

9
10 Figs. 25 to 27 show three positions that can be adopted
11 by the connecting means 101, namely storage position,
12 ready to be connected position and dispersing position.
13 In Figs. 25 to 27 only a portion of container 202 is
14 shown, and the first container 102 is not represented.

15
16 Fig. 25 shows the connecting means 101 and a second
17 container 202, attached to the second part 200 of the
18 connector 101. Part 200 is positioned inside sleeve 106
19 of the first part 100, but the locking protuberances
20 110, 112 are not aligned with the entrance of the
21 pathways 210 and 212 (not shown in that Figure). In the
22 position illustrated the blind end 113 of conduit 114
23 is located directly beneath and abuts the bung or
24 Nicholson valve 290 sealing the bottom of the second
25 container 202. A tamper band 302 can be provided
26 between the two parts 100, 200 of the connector 101 in
27 order to maintain them in that position and so that the
28 packaging system may be then stored and/or transported
29 without disturbance. This is the storage/distribution
30 mode of the packaging system according to this
31 embodiment of the invention.

32
33 To connect the two containers 102, 202 together the
34 tamper band 302 has to be removed as shown in Fig. 26.

35

1 As shown in Fig. 27, and explained above, upon rotation
2 of at least one of the parts 100, 200 of the connector
3 101 the locking protuberances 110, 112 are positioned
4 facing the corresponding pathways 210, 212. Upon
5 further rotation and appliance of reasonable pressure
6 the bottom of second container 202 is then pushed as
7 far as the end of pathways 210, 212. Apertures 126,
8 128 in the shelf 108 of the first part 100 of the
9 connector permit the air present in the space between
10 the two parts 100, 200 of the connector 101 to evacuate
11 quickly.

12

13 The conduit 114 is thus forced against bung or
14 Nicholson valve 290, displacing it inwardly into the
15 interior of container 202 and the packaging system of
16 the present invention is ready for use. The transfer of
17 the first ingredient from the first container 102 into
18 the second container 202 may then be initiated, when
19 required, simply by pressing the first container 102
20 against the connector 101, thus actuating the valve 300
21 of container 102 and causing transfer of the first
22 ingredient into the second container via conduit 114
23 and apertures 117.

24

25 Desirably, the apertures 117 are shaped, sized and
26 spaced to cause the first ingredient to be introduced
27 into the interior of the second container 202 in a
28 spiral motion (eg having vortex characteristics) which
29 causes admixture of the first and second ingredients.

30

31 The second container 202 is advantageously provided at
32 its upper end with any suitable kind of dispensing
33 system which permit the user to obtain the desired
34 mixture of the two elements.

1 CLAIMS

2

3 1. A packaging system comprising :

4 a) a first container having a valve controlling
5 the opening of an outlet and containing a first
6 ingredient; and7 b) a second container having a openable entry
8 portion, containing a second ingredient;
9 and10 c) means for connecting said first and second
11 containers together in order to allow said first
12 ingredient to be displaced from said first
13 container into the second container via the entry
14 portion thereof, so that said first and second
15 ingredients are admixed in said second container
16 to form a final product.

17

18 2. A packaging system as claimed in Claim 1,
19 wherein said first and second containers are
20 each pressurised aerosol containers and
21 wherein the initial pressure in the second
22 container is less than that in the first
23 container.

24

25 3. A packaging system as claimed in either one
26 of Claims 1 and 2, wherein said connecting
27 means comprises a conduit to transfer said
28 first ingredient into said second container.

29

30 4. A packaging system as claimed in any one of
31 Claims 1 to 3, wherein said openable entry
32 portion is located in the bottom of said
33 second container.

34

35 5. A packaging system as claimed in any one of

- 1 Claims 1 to 4, wherein said openable entry
2 portion is a Nicholson valve or a bung.
3
- 4 6. A packaging system as claimed in any one of
5 Claims 1 to 5, wherein said first container
6 is positioned beneath the second container
7 and connected thereto via the connecting
8 means.
9
- 10 7. A packaging system as claimed in any one of
11 Claims 3 to 6, wherein said conduit is shaped
12 to co-operate with the valve of the first
13 container.
14
- 15 8. A packaging system as claimed in any one of Claims
16 1 to 7 wherein said valve of said first container
17 is a directionally biased pressure activated
18 valve.
19
- 20 9. A packaging system as claimed in any one of
21 Claims 3 to 8, wherein said conduit is shaped
22 and sized to facilitate the admixture of the
23 first and second ingredients within the
24 second container.
25
- 26 10. A packaging system as claimed in any one of
27 Claims 3 to 9, wherein said conduit
28 terminates in a blind ending and possesses
29 multiple openings in the side of said
30 conduit, generally adjacent the blind ending
31 thereof.
32
- 33 11. A packaging system as claimed in Claim 10,
34 wherein the conduit openings are shaped and
35 dimensioned to dispense the first ingredient

- 1 in a spiral flow so as to promote admixture
2 of the first and second ingredients.
3
- 4 12. A packaging system as claimed in any one of
5 Claims 1 to 11, wherein said connecting means
6 comprises a first sleeve projecting
7 downwardly which engages the top of the first
8 container and a second sleeve projecting
9 upwardly which engages the bottom of the
10 second container.
11
- 12 13. A packaging system as claimed in Claim 12,
13 wherein said first and second sleeves are
14 sized and shaped to form a close fit with
15 each of said containers.
16
- 17 14. A packaging system as claimed in any one of
18 Claims 1 to 13, wherein said container is a
19 one piece unit.
20
- 21 15. A packaging system as claimed in Claim 12,
22 wherein said connecting means comprises at
23 least a first part and a second part which
24 are rotatable relative to each other, said
25 first part comprising said conduit and said
26 first and second sleeves, and said second
27 part comprising a third sleeve secured to the
28 bottom of the second container, said second
29 and third sleeves having corresponding screw
30 threads, allowing said second and third
31 sleeves to be moved from a first position
32 where the conduit is not actuating said
33 openable entry portion to a second position
34 where said conduit actuates said openable
35 entry portion.

- 1 16. A packaging system as claimed in Claim 15,
2 wherein said connecting means comprises a
3 ratchet mechanism to prevent reversal of the
4 rotation of the first and second parts.
5
- 6 17. A packaging system as claimed in any one of
7 Claims 15 to 16, wherein said rotation of the
8 first and second parts relative to each other
9 is through approximately 120°.
10
- 11 18. A packaging system as claimed in any one of
12 Claims 1 to 17, wherein said second container
13 has a top mounted actuator which controls the
14 dispension of its contents.
15
- 16 19. A packaging system as claimed in any one of
17 Claims 1 to 18, wherein said second
18 ingredient is a powder and wherein said first
19 ingredient is a gel.
20
- 21 20. A packaging system as claimed in any one of
22 Claims 1 to 19, wherein the outlet of said
23 first container is a one-way valve.
24
- 25 21. A packaging system as claimed in any one of
26 Claims 1 to 20, wherein said second container
27 contains a propellant which is also an
28 excipient of the final product.
29
- 30 22. A packaging system as claimed in any one of
31 Claims 1 to 21, wherein said connecting means
32 is made of plastics material.
33
- 34 23. A packaging system as claimed in any one of
35 Claims 1 to 22, wherein said first container

1 is chosen from the group consisting of a
2 piston-style aerosol container where said
3 first ingredient is separated from the
4 propellant gas by a piston and a bag-in-can
5 aerosol container where the first ingredient
6 is separated from the propellant by a bag.
7

8 24. A packaging system as claimed in any of Claims 1
9 to 23, wherein said second container contains a
10 propellant gas which does not react with the first
11 and second ingredients.
12

13 25. A packaging system as claimed in any of Claims 3
14 to 24, wherein the conduit cooperates with said
15 valve of the second container so that when the
16 valve is opened, the conduit permits entry of the
17 first ingredient into the second container to take
18 place.
19

20 26. A packaging system as claimed in any one of
21 Claims 1 to 25, wherein the second container
22 has a bottom-mounted Nicholson valve which is
23 removed or displaced into the second
24 container by said conduit to allow the entry
25 of the first ingredient into the second
26 container.
27

28 27. A packaging system as claimed in any one of Claims
29 1 to 26, wherein means to actuate the displacement
30 of said first ingredient to said second container
31 comprises means to hold the first and second
32 containers in suitable juxtaposition.
33
34

1 / 20

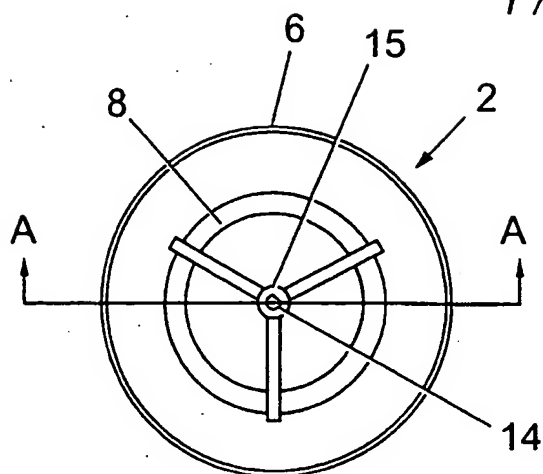


Fig. 2

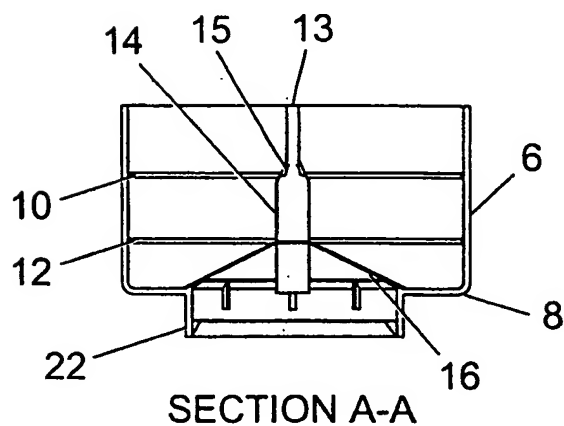


Fig. 3

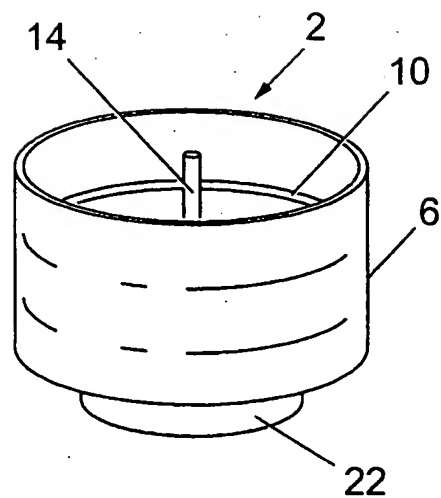


Fig. 1

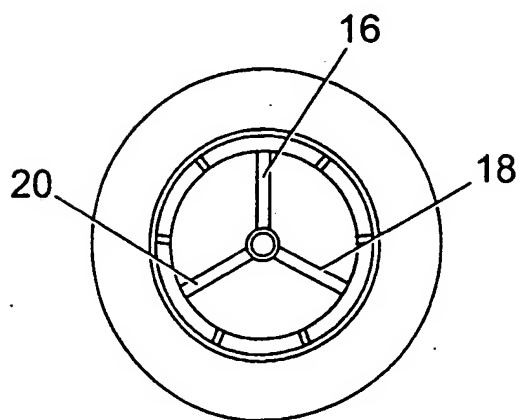
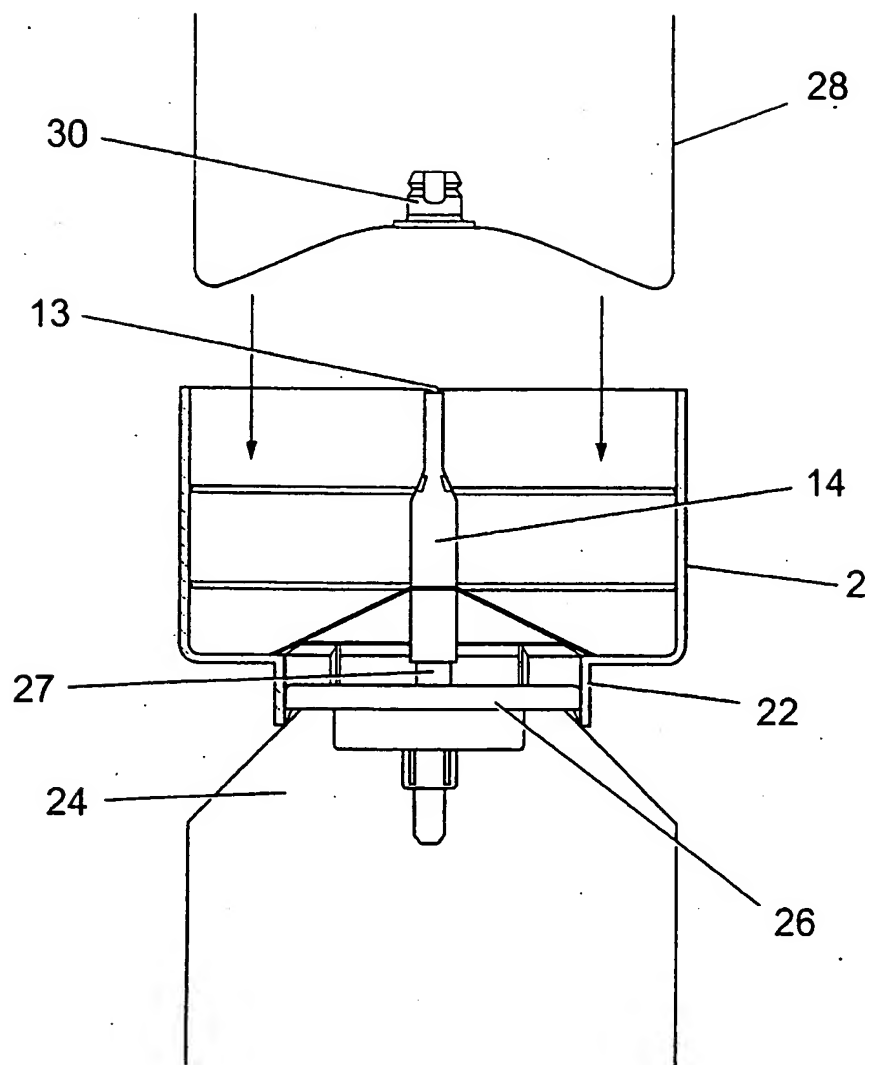
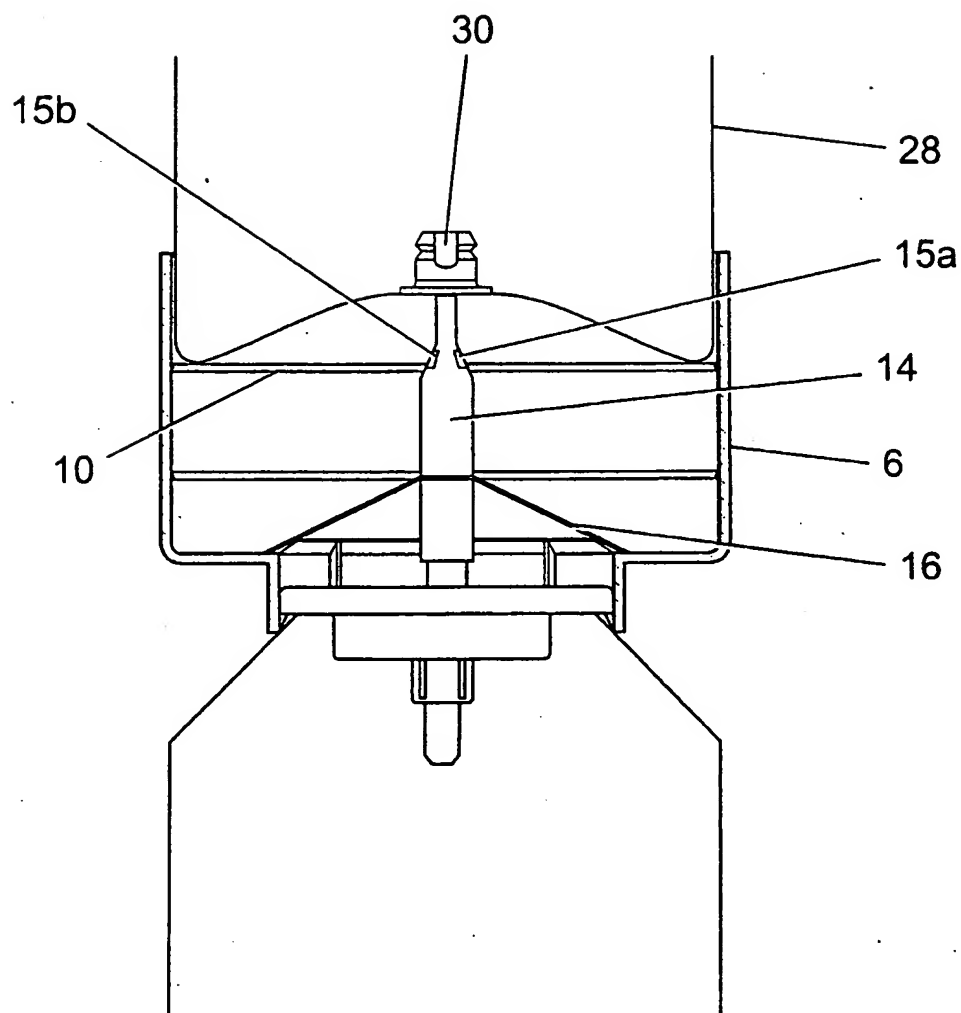


Fig. 4

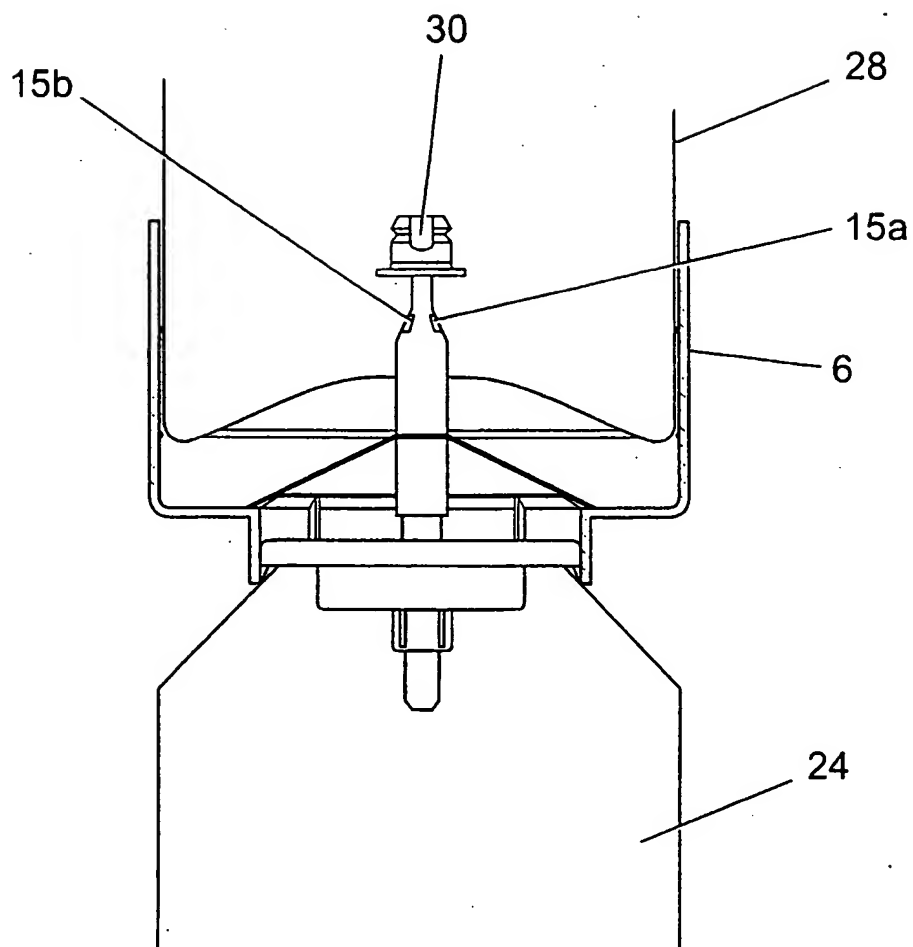
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*Fig. 5*

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*Fig. 6*

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*Fig. 7*

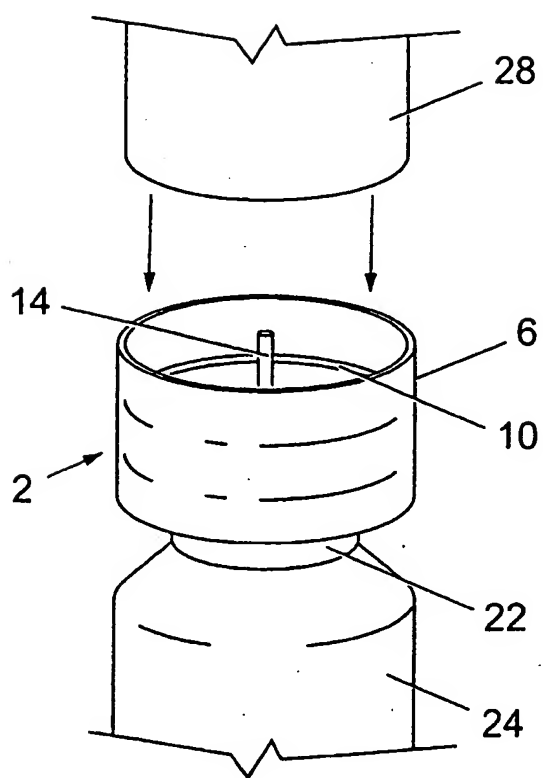


Fig. 8

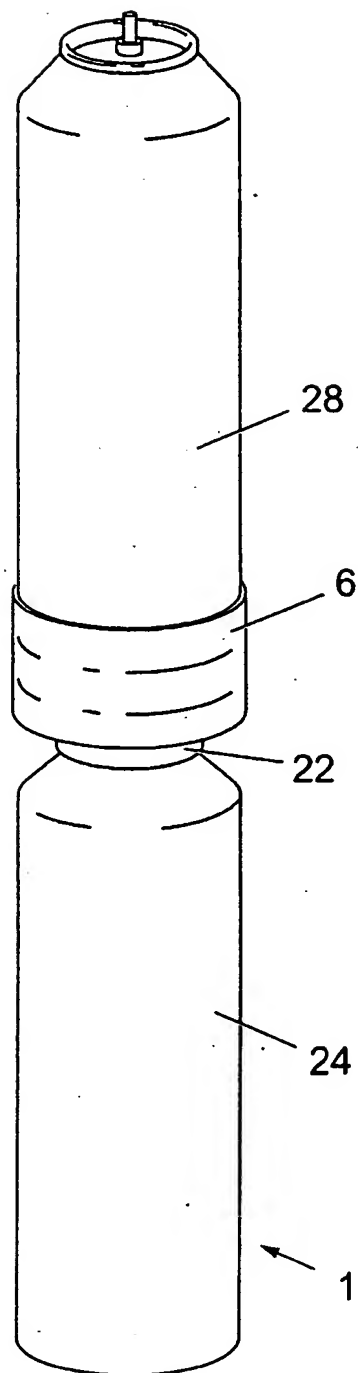


Fig. 9

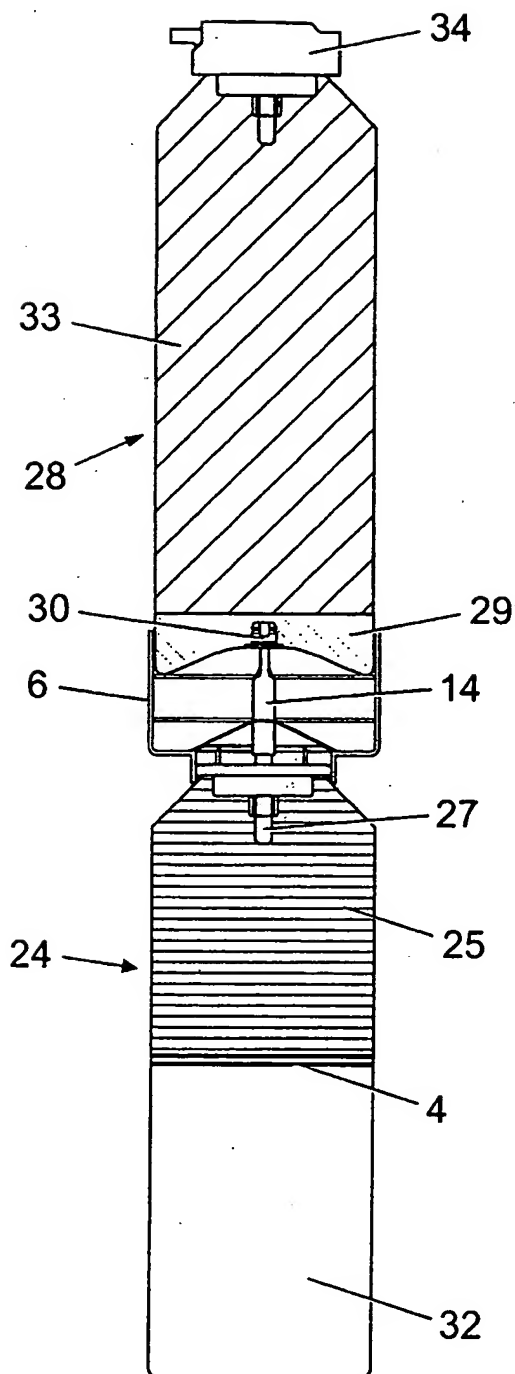


Fig. 10

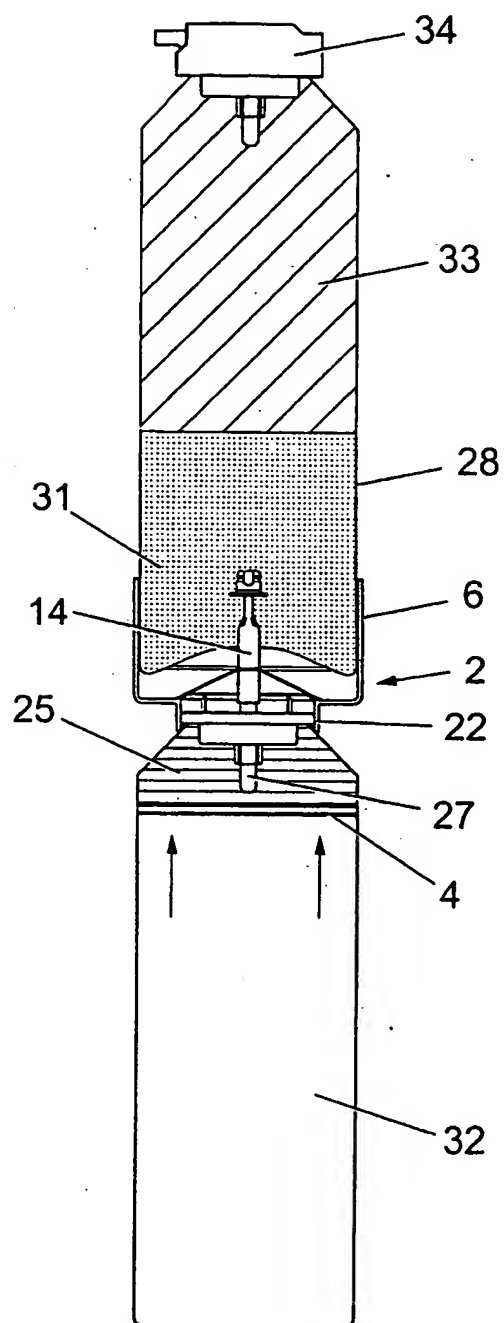
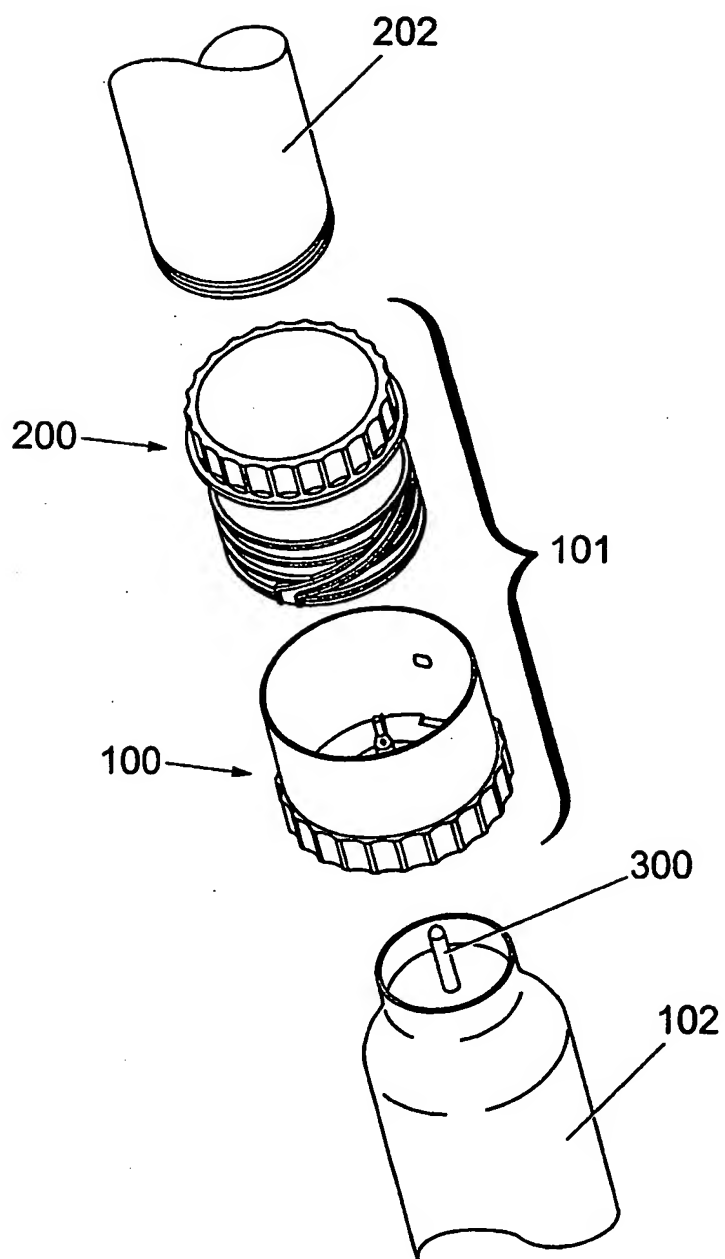


Fig. 11

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*Fig. 12*

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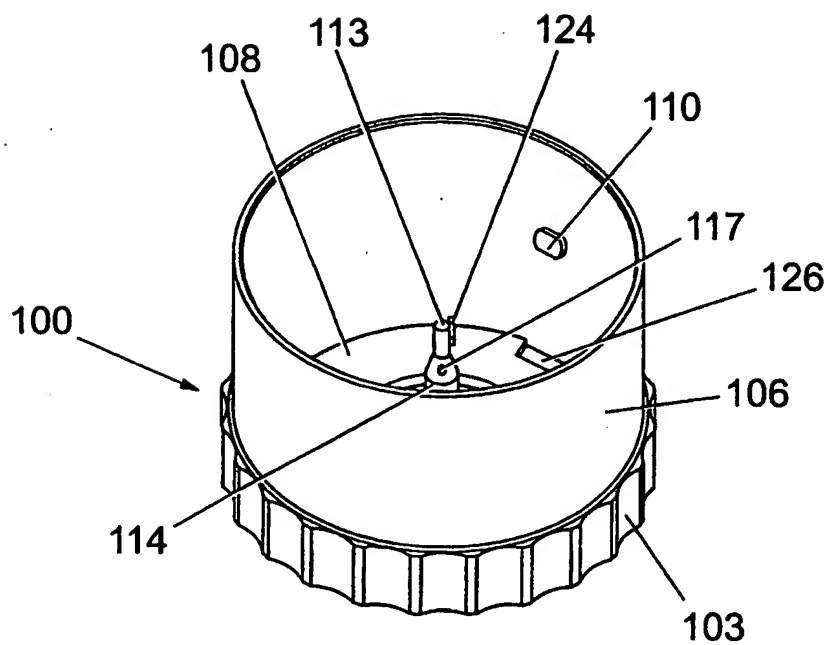
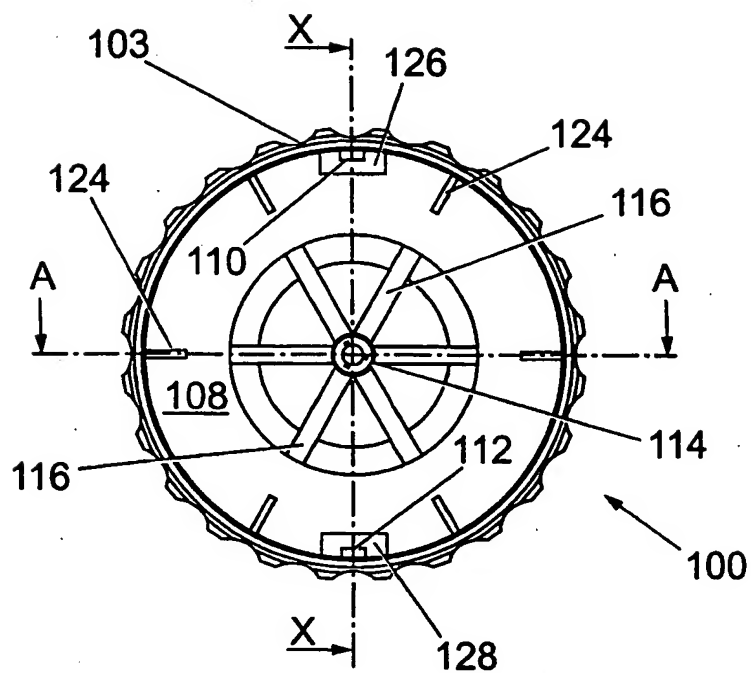
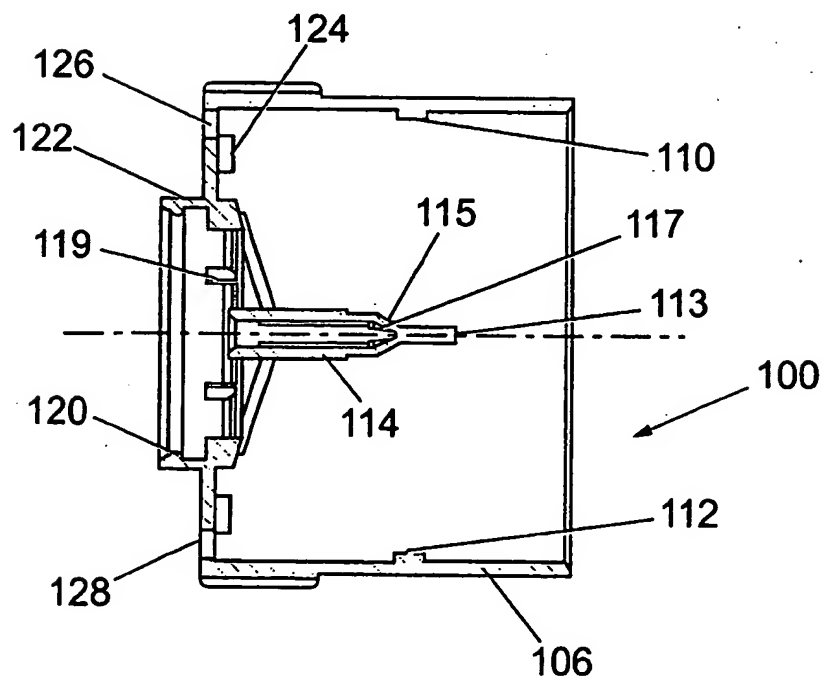
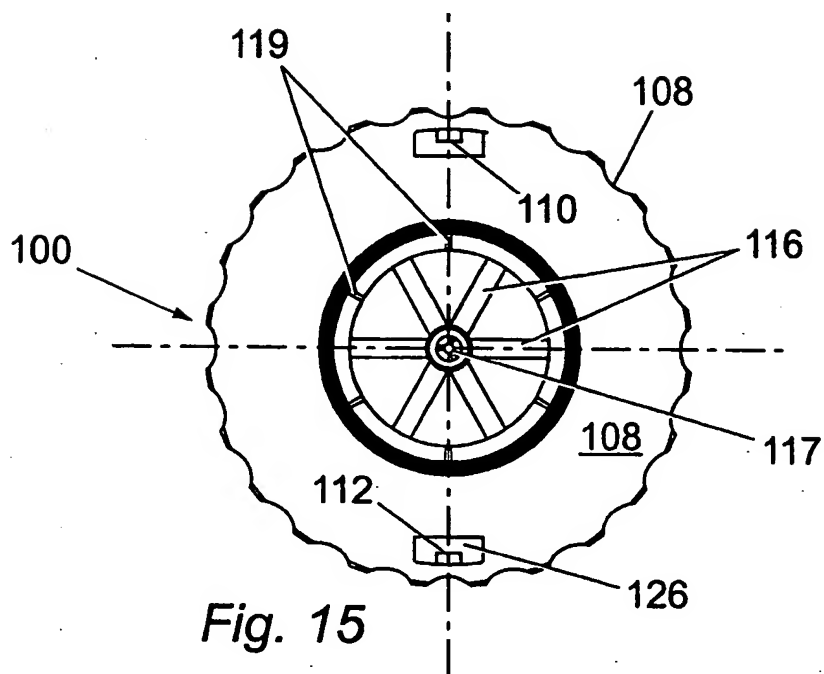


Fig. 13

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*Fig. 14*

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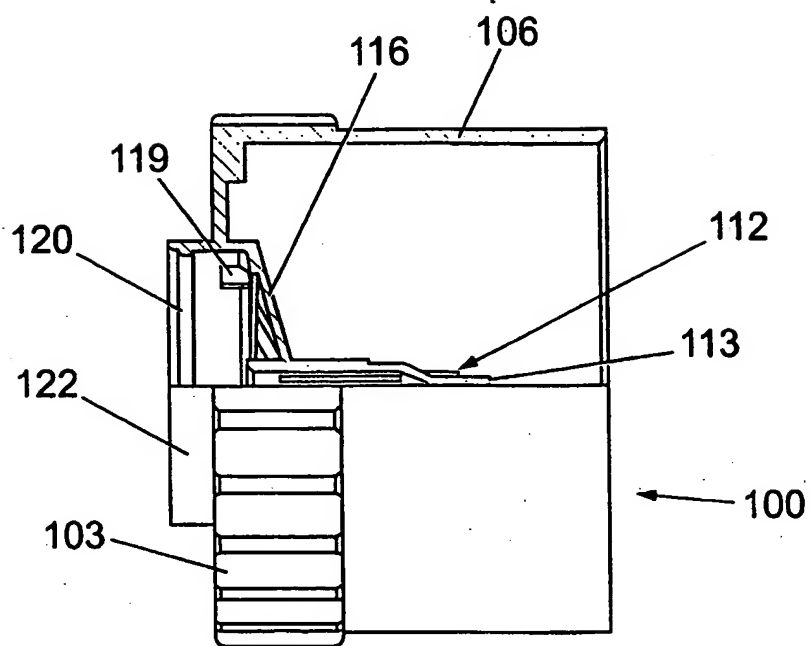


Fig. 17a

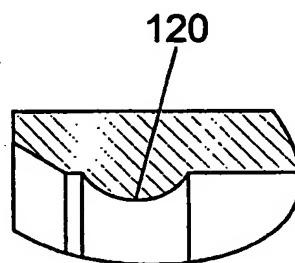


Fig. 17b

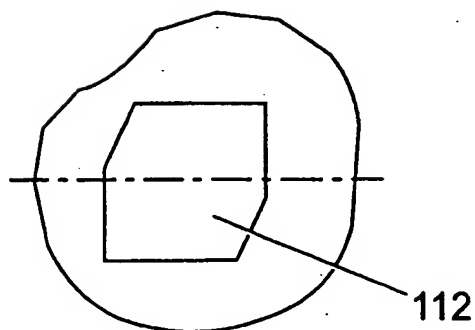


Fig. 17c

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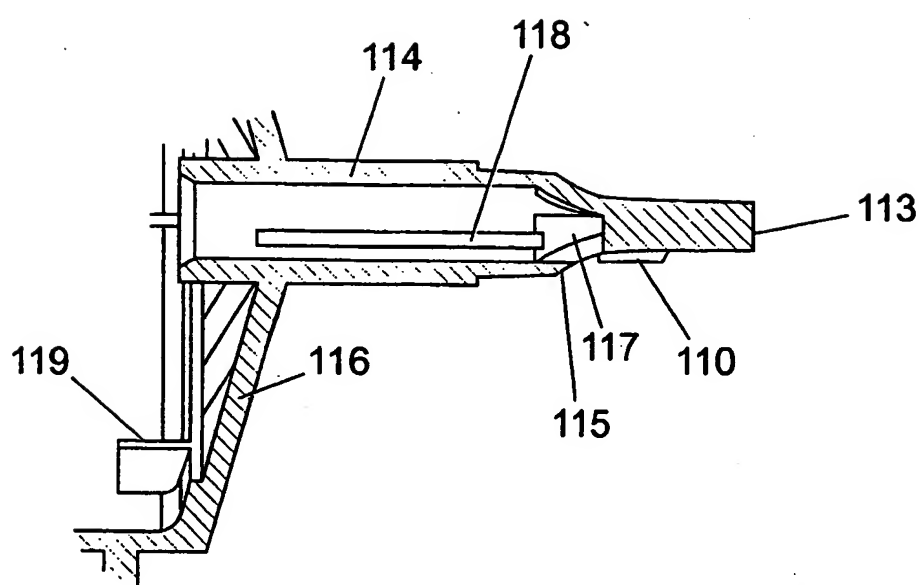


Fig. 18

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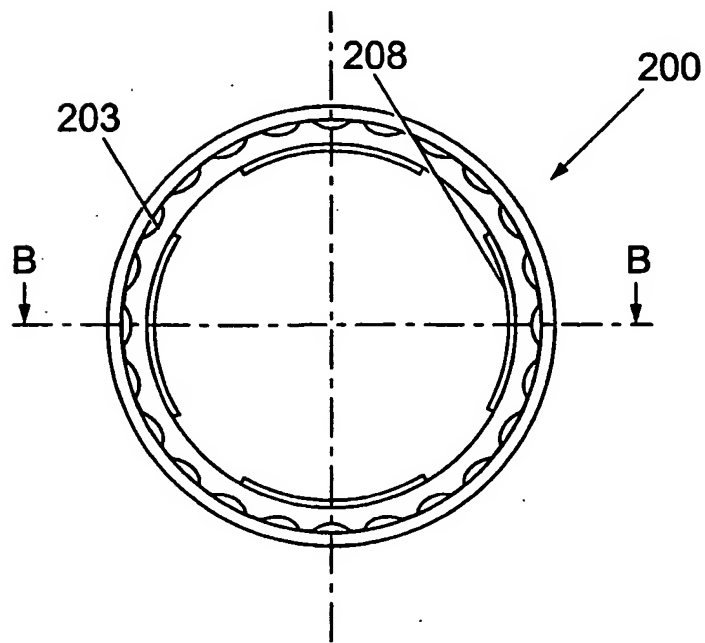
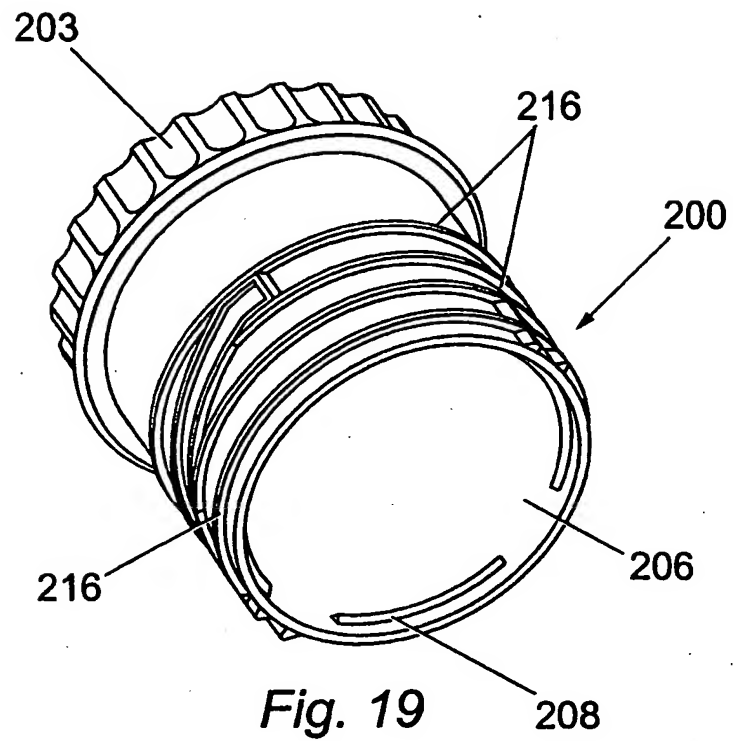


Fig. 20

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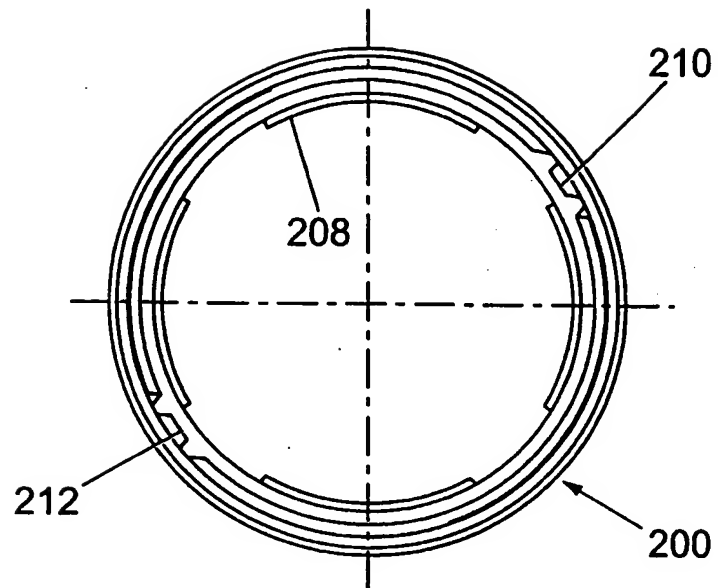


Fig. 21a

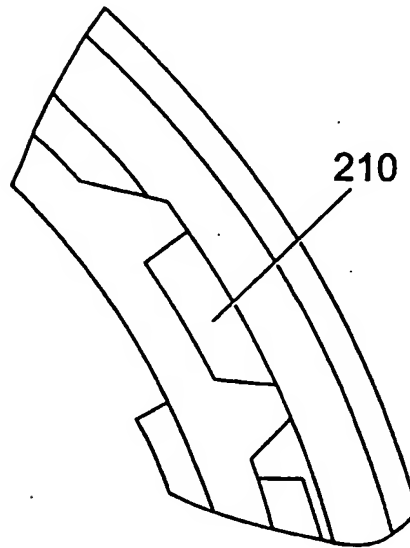
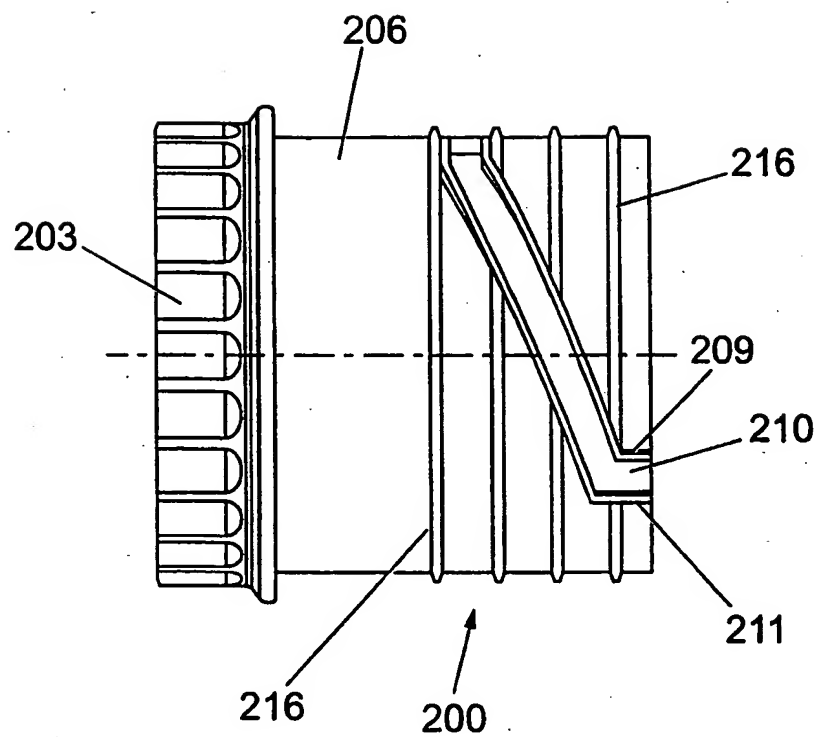


Fig. 21b

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*Fig. 22*

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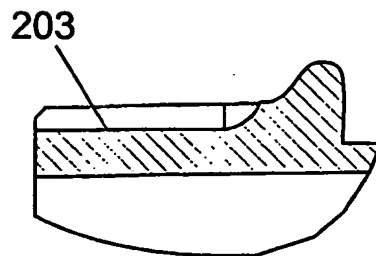
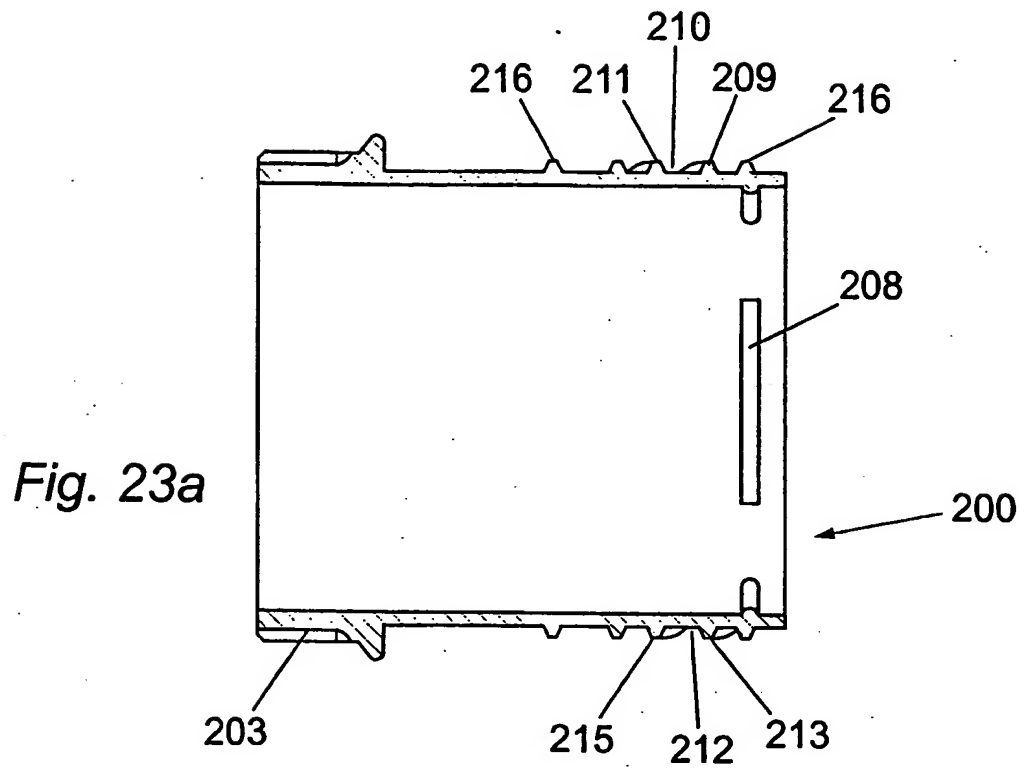
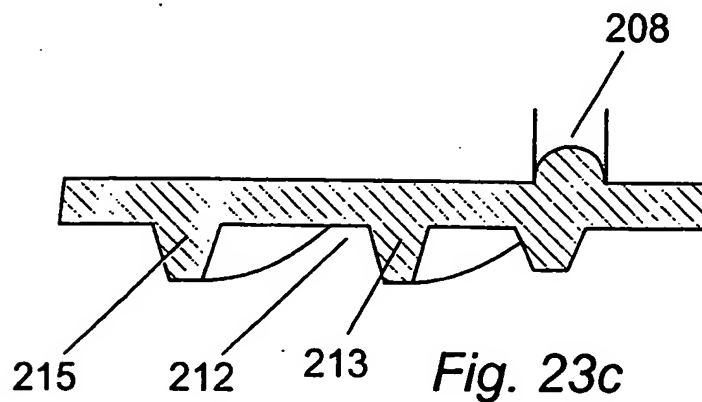


Fig. 23b



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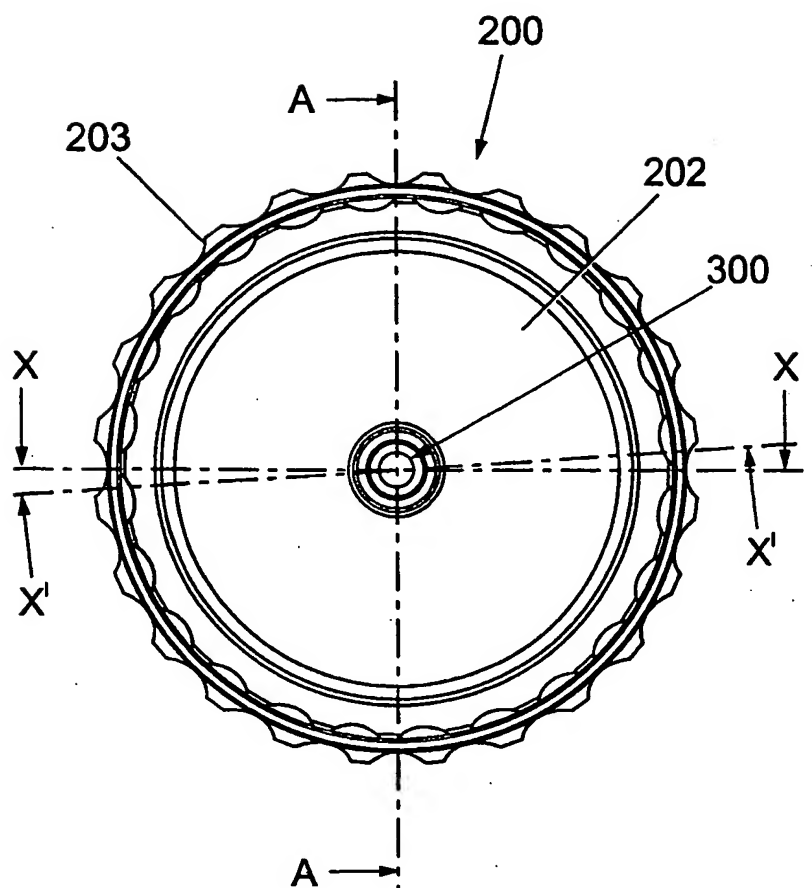
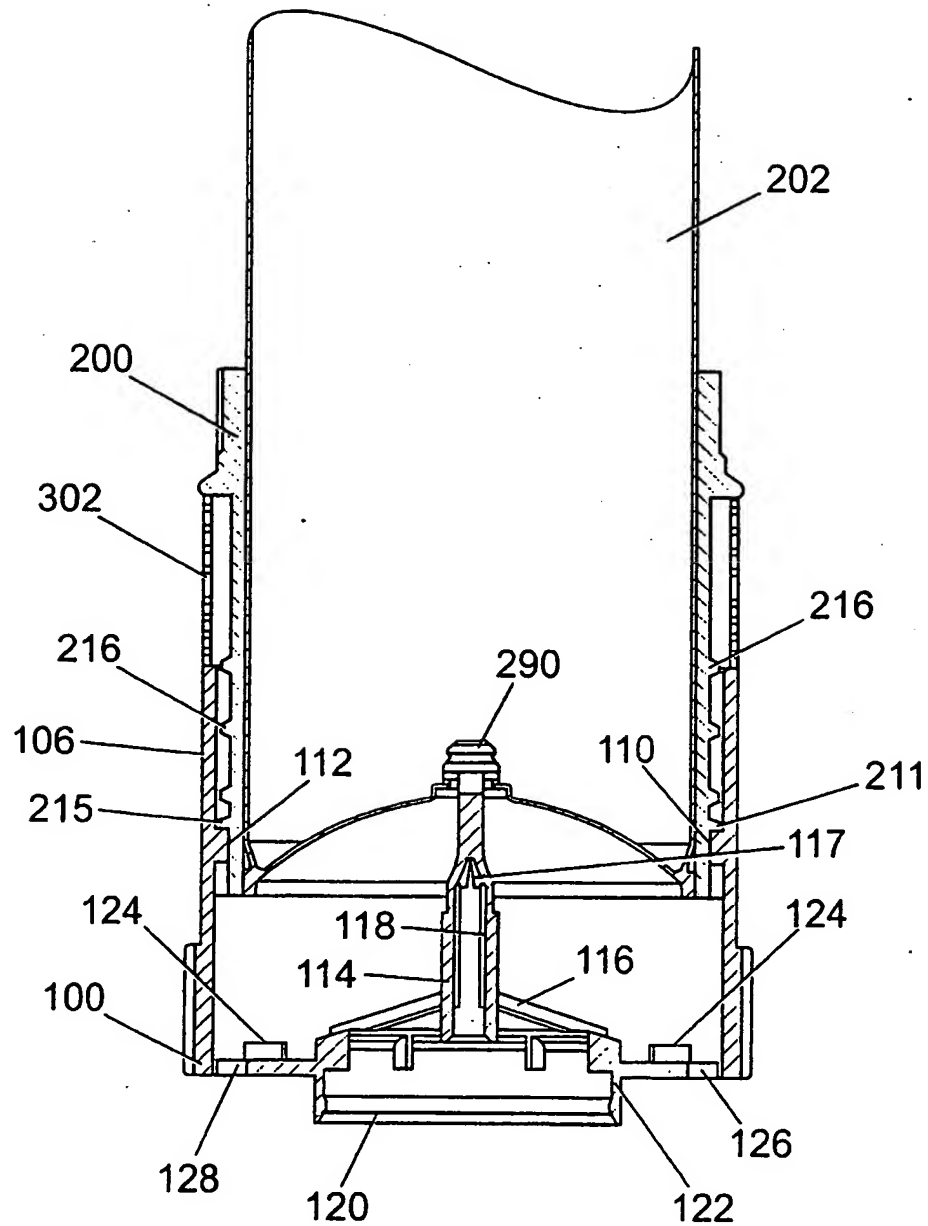
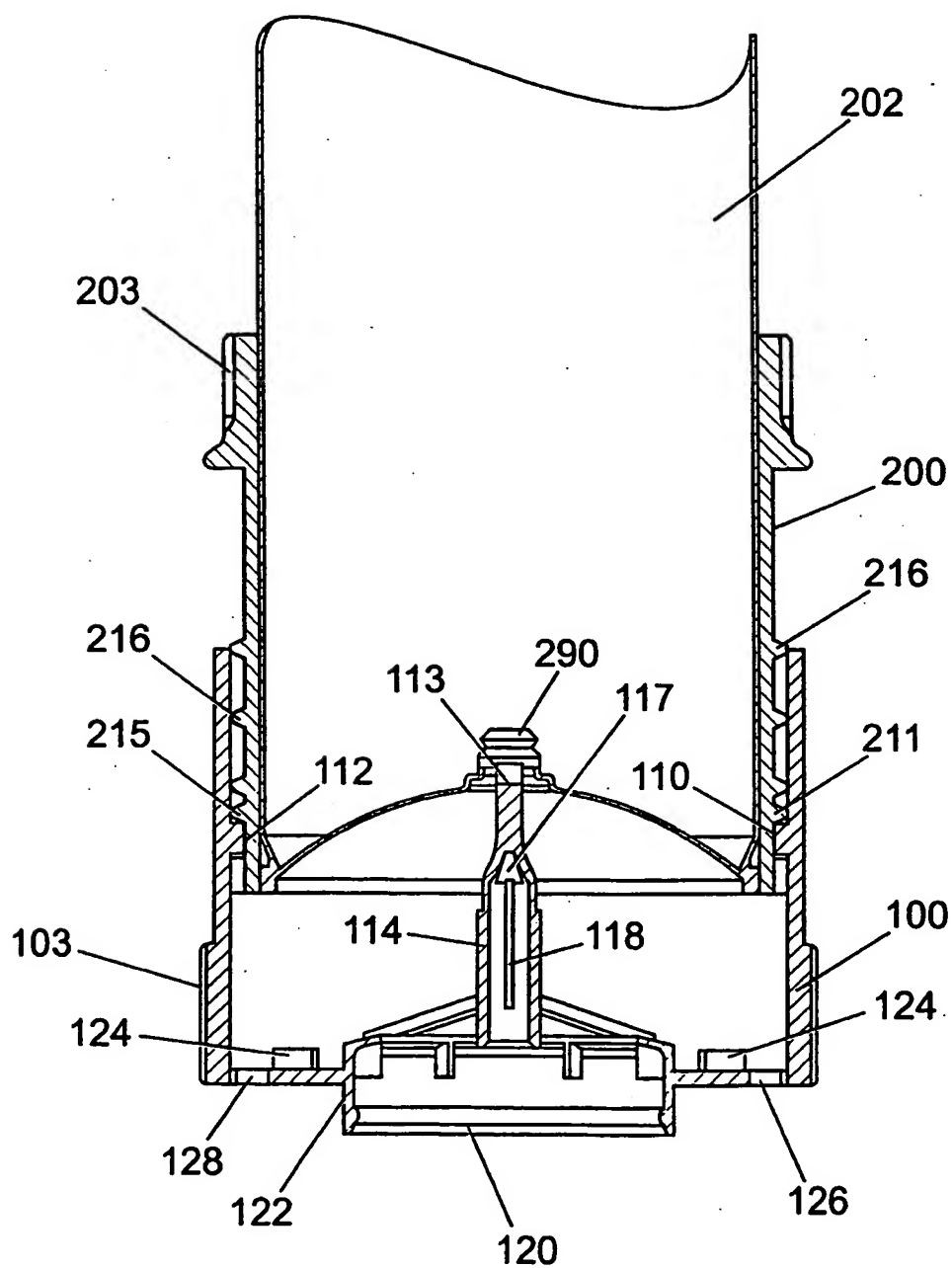


Fig. 24

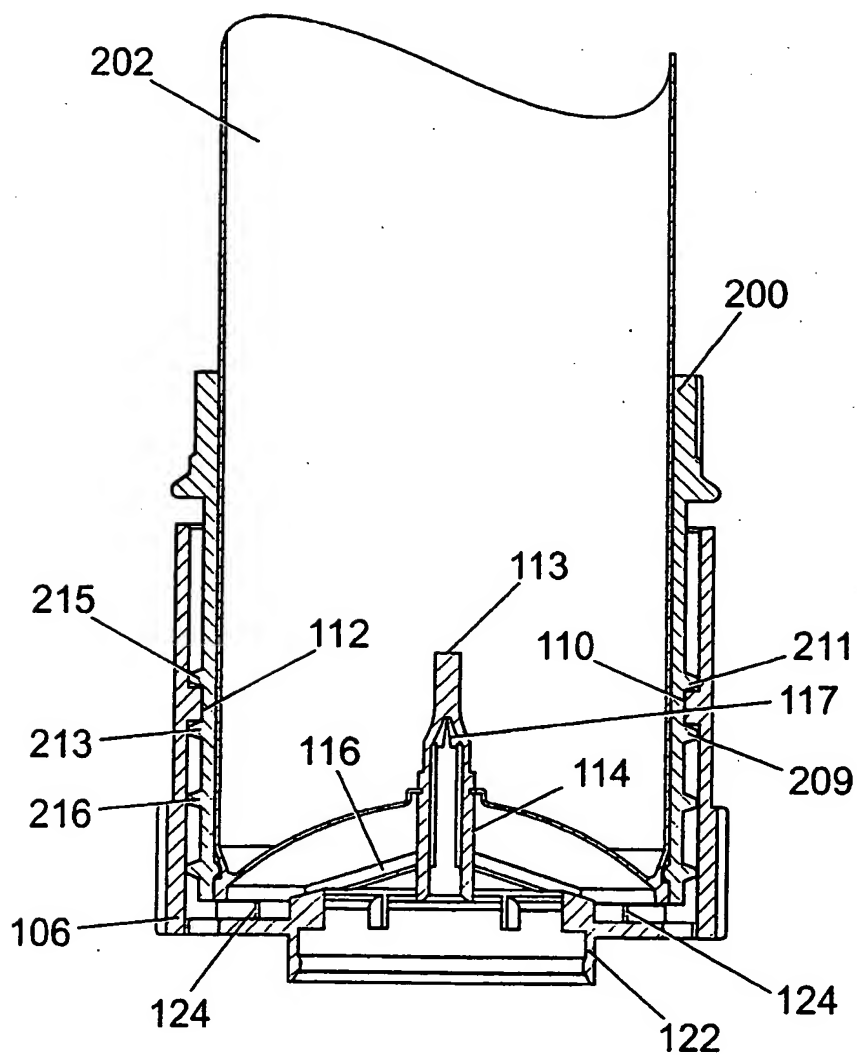
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*Fig. 25*

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*Fig. 26**SUBSTITUTE SHEET (RULE 26)*

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*Fig. 27*

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 99/03516

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65D81/32 B65D83/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 217 582 A (UNILEVER PLC ; UNILEVER NV (NL)) 8 April 1987 (1987-04-08)	1-4,6-8, 12,13, 18,21, 24,25,27
A	claims; figures —	19,20,22
X	GB 1 059 265 A (LABORATOIRES CHIBRIT) 15 February 1967 (1967-02-15)	1-3,7, 18,21, 24,25,27
	claims; figures —	
X	DE 87 04 600 U (COCON KUNSTOFFEN) 15 October 1987 (1987-10-15)	1-3,7, 18,21, 24,27
A	claims; figures —	8,19
	— — — — — -/-	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

22 February 2000

Date of mailing of the international search report

28/02/2000

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INTERNATIONAL SEARCH REPORT

Intern. Appl. No.

PCT/GB 99/03516

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GB 2 142 385 A (BROOKS WILLIAM R) 16 January 1985 (1985-01-16)</p> <p>claims; figures</p>	<p>1,3,4,6, 12,13, 18,19, 21,22, 24,27</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/03516

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GB 2142385 A	16-01-1985	NONE	